

EE106 – Engineering Mathematics I

Problem Set 2

Due in tutorial on Thursday, 16 October 2014

1. Construct an infinite geometric series whose first term is 7 and whose sum is 23. In other words, give appropriate values for a and r .

2. (a) Use the comparison test to prove that the series

$$\sum_{n=1}^{\infty} \frac{1}{3^n + 2n}$$

converges. (Hint: think of a convergent geometric series that you can compare it to.)

- (b) Use the ratio test to show that the series

$$\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}$$

converges for any value of x .

3. Find the following limits:

- (a) $\lim_{x \rightarrow 1} \frac{x^2 - 25}{x + 5}$

- (b) $\lim_{x \rightarrow 2} \frac{x^3 - 343}{x - 7}$

- (c) $\lim_{x \rightarrow 1} \frac{1 - x}{1 - \sqrt{x}}$

4. (a) Plot the function $f(x) = |x|$. Is it continuous or discontinuous at $x = 0$?

- (b) Draw a graph which depicts a function with discontinuities at -2 , 0 , 1 and 2.5 .